

REMARKS

Claims 1-12 and 27-109 are pending in this application. Claims 75-109 have been newly added.

Applicants are pleased to note the Examiner indicated that claims 49-75 are allowed and claims 4-9, 12, 27-32, 36-42, and 45-48 would be allowable if rewritten in independent form including all the limitations of the base claims and any intervening claims.

Claim Rejections – 35 USC § 102

Claims 1, 2 10, 11, 33-35, 43 and 44 are rejected under 35 U.S.C. § 102(b) as being anticipated by Izumi (JP 6119632). Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action contends that Izumi discloses a lithographic projection apparatus comprising the elements recited in claim 1 and in particular a height mapping system with at least one sensor (3a) to measure positions of a plurality of points on a surface of a substrate in a first direction and to measure a position of the physical reference surface in the same direction, and creating a height map relative to the reference surface. The Office Action further contends that Izumi teaches a position measuring system located at the exposure station (3b), and a position controller (8a) constructed and arranged to control a position of the second object table during exposure. Applicants respectfully disagree.

In Izumi, the autofocus detecting mechanism 3a and autofocus detecting mechanism 3b are completely dissociated from each other. Specifically, the autofocus detection mechanism 3a is used to measure the depth of the substrate surface 30 at a number of reference planes 33 on the surface 30 of substrate 6 (see, Figure 5 in Izumi) relative to interferometer 1, while the autofocus detection mechanism 3b is used to measure the depth of the substrate focus reference plane 31 relative to projection optical system 9 (see, Figure 1 and English Abstract in Izumi). Because the interferometer 1 and the projection optical system 9 do not provide the same reference point during the two measurements by detection mechanisms 3a and 3b, a movement of optical system 9 relative to interferometer 1 (due to vibration, for example) can lead to error during autofocus correction to conform to the surface shape of the substrate.

In contrast, the invention recited in claim 1 provides a height mapping system located at the measurement station comprising at least one sensor constructed and arranged both to measure positions of a plurality of points on a surface of the substrate in a first direction substantially perpendicular to said surface and to measure a position of the physical reference surface in the first direction.

Therefore, in the invention recited in claim 1 one reference is used for both measurements of a plurality of points on a surface of the substrate as well as measurement of the position of the physical reference fixed on the object table. An advantage of the claimed invention is, for example, measurement of the position of the surface of the substrate and the position of the physical reference surface by the same sensor thus eliminating the need to know the relationship between the two detectors 3a and 3b disclosed in Izumi. Consequently, for at least this reason, Izumi does not disclose, teach or suggest the subject matter recited in claim 1.

In response to Applicants arguments, the Office Action states that claim 33 is rejected based on Izumi because claim 33, unlike claim 1, does not claim using only one sensor to measure positions of the points on a surface of a substrate and the reference surface.

Claim 33 recites, *inter-alia*, "to measure a position of said second object table in said first direction substantially simultaneously with the measurement of at least one of the positions of the plurality of points on the surface of said substrate and the position of said physical reference surface."

Izumi does not provide a measurement of a position of the wafer chuck 7. Izumi merely provides measurement of the wafer chuck focus reference plane 31.

Therefore, for at least the above reasons, Applicants submit that Izumi does not disclose, teach or suggest the subject matter recited in claim 33.

Therefore, Applicants respectfully submit that claims 1 and 33, and claims 2, 10, 11, 34, 35, 43 and 44 which are directly or indirectly dependent from either claim 1 or claim 33 are patentable over Izumi and respectfully request that the rejection of claims 1, 2, 10, 11, 33-35, 43 and 44 under § 102(b) be withdrawn.

Claim 33 is rejected under are rejected under 35 U.S.C. § 102(e) as being anticipated by Loopstra (US Pat. No. 6,208,407). Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action contends that Loopstra discloses a height mapping system with at least one sensor (150, 160) to measure positions of a plurality of points on a surface of a substrate in a first direction and to measure a position of the physical reference surface in the same direction, and creating a height map relative to the reference surface (Fig. 2-8), a position measurement system and a controller. In response to arguments, the Office Action states that claim 33 is rejected with Loopstra reference because, unlike claim 1, claim 33 does not claim using only one sensor to measure positions of the points on a surface of the substrate and the reference surface.

Claim 33 recites, *inter-alia*, “to measure a position of said second object table in said first direction substantially simultaneously with the measurement of at least one of the positions of the plurality of points on the surface of said substrate and the position of said physical reference surface.”

In contrast, the method of Loopstra simply provides measuring simultaneously the height of each substrate field and the height of the substrate holder reference plane (See, col. 4, lines 12-15). Thus, Loopstra does not disclose, teach or suggest measuring a position of the object table simultaneously with the measurement of at least one of the positions of the plurality of points on the surface of the substrate and the position of the physical reference surface. Consequently, for at least the above reason, Applicants submit that Loopstra does not disclose, teach or suggest the subject matter recited in claim 33.

Therefore, Applicants respectfully submit that claim 33 is patentable over Loopstra and respectfully request that the rejection of claim 33 under § 102(e) be withdrawn.

Claim Rejections – 35 USC § 103

Claim 3 is rejected under 35 U.S.C. § 103(a) as being anticipated by Izumi in view of Loopstra. Applicants respectfully traverse this rejection for at least the following reasons.

Claim 3 is dependent from claim 1. Therefore, for at least the above reasons presented for claim 1, Applicants submit that Izumi does not disclose teach or suggest the subject matter recited in claim 3. Furthermore, Loopstra does not overcome the deficiencies noted for Izumi because Loopstra does not disclose, teach or suggest “a height mapping system...comprising at least one sensor...both to measure positions of a plurality of points on a surface of said surface...and to measure a position of said physical reference surface,” as recited in claim 1. Consequently, neither Izumi nor Loopstra, alone or in combination, disclose teach or suggest the subject matter recited in claim 3.

Therefore, Applicants respectfully submit that claim 3 is patentable and respectfully request that the rejection of claim 3 under § 103(a) be withdrawn.

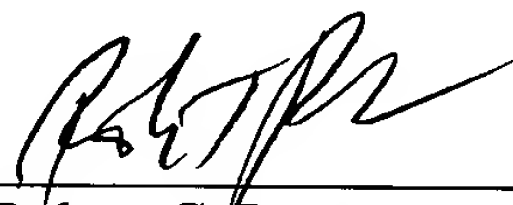
Claims 76-109 have been newly added. Support for the claim language may be found throughout the specification. Claims 76-96 are directly or indirectly dependent from claim 1. Therefore, for at least the reasons presented above in claim 1, Applicants submit that claims 76-96 are patentable. Claims 97-109 are directly or indirectly dependent from claim 33. Therefore, for at least the reasons presented above in claim 33, Applicants submit that claims 97-109 are patentable.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,
PILLSBURY WINTHROP LLP

By: 
Robert C. Perez
Reg. No.: 39,328
Tel. No.: (703) 905-2159
Fax No.: (703) 905-2500

RCP/KG
1600 Tysons Boulevard
McLean, VA 22102
(703) 905-2000